Heat and Motion in a Liquid Lab

How do convection currents transfer heat in a fluid? Convection currents transfer heat in a fluid because the fluid moves away from the source of heat.

Background: As you watch a pot of water come to a boil on the stove, you notice that bubbles rise to the surface of the water, first slowly and then more rapidly. You're curious about why the bubbles rise from the bottom of the pot. So, you decide to investigate. In this activity, you will observe how heat is transferred through the movement of fluids.

Materials:

* Aluminum pan
* Clear plastic cup
* Plastic dropper
* Hot water
* Cold water
* Food coloring
* Stopwatch (on your computer)

Procedure:

1. Carefully pour some hot water into the small aluminum pan. Fill the clear plastic cup about half full with cold water. Place the cup in the center of the pan.
2. Allow the water to stand for two minutes until all motion stops.
3. Fill the dropper with a small amount of food coloring.
4. Hold the dropper under the cold water's surface and slightly away from the edge of the cup. Then, gently squeeze a small droplet of the food coloring into the cold water.
5. Observe the water for one minute. Write at least 5 detailed observations in the space below:

| Observations: 1. The dye is rising and sinking and staying in the same place.  2. When we put one drop in the dye went all over the place and is more dark blue than the last time.  3. We put four drops in it, went all over the place and it was more dark blue than the last time. It went in different directions when we put it in. |
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Analyze and Interpret Data:

1. How can you explain what happened to the droplets of food coloring that were added to the cold water? When the drops were added to the cold water it went in different directions or stayed the same.
2. Why do you think the second droplet of food coloring moved differently from the first droplet? It is because we put a plastic dropper in the water but we did one drop in it so it went in a different direction.
3. Apply what you observed in your model to explain what happens when a pot of water boils on a stove. When water boils on a stove it starts bubbling and steam comes out of it.
4. Currents in Earth’s mantle are caused by the constant movement of semi-liquid material between areas with high temperatures near the core and areas with cooler temperatures near Earth’s surface. Use your model from this activity to explain how heat is transferred on a larger scale through such currents. In our aluminum pan the heat was moving not really on a large scale but it was staying still and convection currents were in the hot water. Earth’s mantle is hot and it solid rock but ours is hot water and they both have convection currents coming through both.